

REMARKS

Regarding the rejected claims 1, 2, 14-22 and 24-40, Applicants have noted and carefully studied the Examiner's comments and the cited art. Applicants respectfully traverse the rejections and request reconsideration. For the reasons set forth below, Applicants submit the claims are allowable as written.

§ 103(a) Rejections

Duluk, Jr. et al.

Duluk is directed to a graphics processor with deferred shading (Duluk, Title). An important feature of the method and apparatus of Duluk is the avoidance of wasted computations by eliminating hidden portions of geometry before they are rasterized, while still being simple enough to build in cost-effective hardware. (Duluk, Col. 2, lines 60-65). Duluk augments the capabilities of MCCAM (magnitude comparison CAM, most content addressable memories) by adding various features, including the ability to output all the query result bits every clock cycle and to logically "or" together these output query result bits to form additional outputs. (Duluk, col. 12, lines 41-45). In order to save memory bandwidth and realize other benefits, Duluk performs a "virtual" block transfer or virtual BLT by splicing the data in or reading the data from an alternate location. (Duluk, col. 40, lines 5-10).

Lentz et al.

Lentz et al. is directed to a system for polygon rasterization. The Summary Of The Invention section describes the system as using edge functions, which classify each pixel within the plane of the polygon, to display such polygons. Such pixels are rendered based on the value of its edge function variables. Each pixel within a triangle has associated with it a set of multiple edge variables that are used in rendering such pixels. Lentz et al. does not disclose the use of

tiles, sorting vertex data, generating region bits, nor the generating an initial rasterization starting point estimate according to the region bits.

Claims 1-2, 14-22 and 24-40

The Office Action rejects claims 1-2, 14-22 and 24-40 under 35 U.S.C. 103(a) based on Duluk, Jr., et al. ("Duluk," 6,597,363) in view of Lentz et al. (5,446,836).

Independent Claim 1

Independent Claim 1 recites:

1. A method for providing an initial rasterizing point, comprising:
 - receiving vertex data corresponding to the vertices of a primitive, the vertex data including x-coordinate and y-coordinate position information;
 - sorting the vertex data in coordinate-dependent fashion;
 - generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered;
 - generating coordinate data representing an initial rasterization starting point estimate when the region bits indicate that at least one of the sorted vertex data lies within the current tile being rendered and discarding the sorted vertex data of primitives that lie outside the boundary of the current tile being rendered; and
 - providing the initial rasterization starting point estimate to a rasterizer.

Applicants acknowledge the statement in the Office Action that Duluk, Jr., et al., does not specifically disclose "generating coordinate data representing an initial rasterization starting point estimate."

According to the Office Action on page 2, Duluk is cited at col. 54, lines 1-16, col. 54, line 14 and col. 81, lines 8-33, which state, "the GEO block compares vertex clip coordinates to the clip planes [to] generate outcodes" and "it uses these outcodes to reject primitives that are outside the view volume (for example, if all of the vertices in a primitive are above the top clipping plane, the primitive is rejected)" and "the outcodes indicate an edge intersecting a clip

plane” which is limited to outcodes that compare vertex clip coordinates to the vertex clip plane rather than “generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered.” The undersigned would like to point out the distinction between generating an outcode that indicates if the primitive is entirely inside or outside the view volume and “generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered.” For example, the cited portion of Duluk fails to describe “region bits” and “the location of the sorted vertex data,” let alone “generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered.”

Duluk as cited at col. 81, lines 8–33, which states “we need to determine the intersection of the primitive on the current tile to get the minimum z and bounding parameters needed for MCCAM cull in the CUL block” and “we use primitive clip descriptors to describe the intersection of the primitive on the tile” rather than “generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered. Again, nowhere does the Office Action show where Duluk, as cited, describes “the location of the sorted vertex data” nor “region bits.” The undersigned would like to point out the distinction between clip codes and “region bits.” Further, the undersigned would like to point out that Duluk, as cited, rather than reciting “the location of the sorted vertex data with respect to a current tile being rendered” because Duluk teaches “the outcodes indicate that the primitive is entirely inside the view volume” (Duluk, col. 54, lines 8–10) rather than “generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered.”

Therefore, Applicants submit that Duluk fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants’ claimed subject matter

including, inter alia, "... generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered ...," (claim 1).

Applicants further submit that not only does Duluk not disclose, teach or suggest Applicants' claimed subject matter including, inter alia, "generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered" (claim 1), but is wholly different that Applicants' claimed subject matter. Duluk, as cited, is absent any discussion that would suggest that any type of region bits representing the location of the sorted vertex data is generated. As such, Duluk does not disclose, teach or suggest any need for the outcodes to represent the location of sorted vertex data since the outcodes merely represent an indication that the primitive is either inside or outside of the view volume. Further, to introduce the generation of region bits representing the location of the sorted vertex data would mean to degrade the performance of Duluk's system without benefit, as such operations would use up system resources that could be used by other processes by Duluk.

The Duluk language cited by the Office Action which states descriptors are obtained by sorting the triangle vertices by their y-coordinates (Duluk, col. 34, line 13) and sorting the triangle vertices by their x-coordinates (Duluk, col. 34, line 36) rather than "generating coordinate data representing an initial rasterization starting point estimate when the region bits indicate that at least one of the sorted vertex data lies within the current tile being rendered and discarding the sorted vertex data of primitives that lie outside the boundary of the current tile being rendered ...," (claim 1). Applicants submit that Duluk fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants' claimed subject matter including, inter alia, "... generating coordinate data representing an initial rasterization starting point estimate when the region bits indicate that at least one of the sorted vertex data lies

within the current tile being rendered and discarding the sorted vertex data of primitives that lie outside the boundary of the current tile being rendered ...," (claim 1).

As acknowledged in the Office Action, Duluk does not disclose an "initial rasterization starting point estimate." In support, Applicants reiterate that Duluk does not recite "generating region bits representing the location of the sorted vertex data with respect to a current tile being rendered" as previously stated, and as such, Duluk cannot therefore teach "discarding the sorted vertex data of primitives that lie outside the boundary of the current tile being rendered" since Duluk does not teach the sorted vertex data as claimed. In contrast, Duluk is generally focused to a system to avoid wasted computations by eliminating hidden portions of geometry before they are rasterized.

The Office Action states that the step of generating coordinate data for an initial rasterization starting point estimate is necessarily required for displaying a clipped image by a rasterizer. Applicants traverse this point as no such initial rasterization starting point estimate need be generated, nor is generated, in conjunction with that disclosed in Duluk. Just as in a typical rasterization process, one next pixel is generated at a time, and where such next pixel happens to be a point in an object, then such pixel is then rendered with the object information, however, such pixel was found not by any estimation of such pixel, but simply by the sequential processing of one pixel after another. As such, what is disclosed in Duluk is in contrast to Applicants' claimed subject matter which avoids the pixel by pixel search of the first point of a primitive by instead, generating such an initial rasterization starting point estimate.

The Duluk language cited by the Office Action which states that descriptors are used for clipping of primitives on top and bottom tile edges (Duluk, col. 77, lines 61-63) merely describes the clipping of primitives rather than "generating coordinate data representing an initial rasterization starting point estimate." Further, the reference to Duluk, col 115, line 53+, which

recites a graphic rendering system for forming a rendered image from graphics primitives does not specifically cite to a portion of Duluk at col. 115, line 53+ which cites "generating coordinate data representing an initial rasterization starting point estimate."

Applicants also submit that to the extent Lentz et al. describes a system using edge functions which classify each pixel within the plane of the polygon to display such polygons, and where the rendering of pixels is based on the value of pixels edge variables, that Lentz et al. is absent any disclosure, teaching or suggestion of Applicants' claimed subject matter. Applicants submit that Lentz et al. focuses on edge functions rather than vertices. Although the edges of such polygons are defined by vertices, the system focuses on the processing of the polygons in relation to their edge functions rather than their vertex data. Lentz et al. also appears to focus on rendering the polygons themselves, regardless where they fall within the actual display area. As such, Lentz et al. appears to be absent any use of tiling as its focus is on a polygon itself, whether or not such a polygon might cross what would otherwise be multiple tiles. Further, with the absence of any disclosure of tiles in Lentz et al., Applicants submit, further implies the lack of any use of region bits therein as region bits are specifically tied to the use of tiles that make up only a subsection of a larger display. Applicants submit that at least because Lentz et al. does not disclose the use of tiles, that therefore Lentz et al. does not disclose, teach or suggest, Applicants' use of an initial rasterization starting point estimate, as such point estimate is based on a location with a tile representing a first point of a primitive therein. Applicants refer to the steps of Figs. 11_A and 11_B, and the Lentz et al. disclosure generally, to submit that Lentz et al. does not disclose (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate.

Applicants further submit that Duluk fails to disclose, teach or suggest, whether considered alone, or in combination with the other cited art, Applicants' claimed subject matter

including, inter alia, "... providing the initial rasterization starting point estimate to the rasterizer ...," (claim 1). Applicants refer the Examiner to the above arguments directed to the lack of any disclosure, teaching or suggestion in Duluk, when considered alone, or in combination with the other cited references, for the use of an initial rasterization starting point estimate.

Applicants note that in order for prior art references to be combined by obviousness, at a minimum, there must be a suggestion of desirability for the modification. Applicants submit that neither Duluk nor Lentz et al., suggest a desirability for modification, explicit or otherwise. In addition, there must be a teaching or suggestion to make the combination and a reasonable expectation of success must be both found in the prior art, and not based on applicant's disclosure. Further, the level of skill in the art cannot be relied upon to provide the suggestion to combine references. Additionally, since none of the cited references teach or suggest the use of tiles, sorting of vertex data for use with tiles, use of region bits, and generating an initial rasterization starting point estimate, the combination of any of the cited references cannot produce the Applicant's invention as claimed.

According to the Office Action, the motivation to modify Duluk "would have been to decrease a substantial time of the rasterization efficiently and to minimize computation time for rasterization (by eliminating the image process on invisible side). (Office Action dated April 7, 2004, page 3, last sentence). However, Duluk seeks to avoid wasted computations by eliminating hidden portions of geometry before they are rasterized (Duluk, col. 2, lines 60-65) rather than, as asserted in the Office Action, to "generate coordinate data representing an initial rasterization starting point estimate." As previously stated, since the Office Action fails to show any type of starting point estimate let alone "an initial rasterization starting point estimate" in the combination of Duluk and Lentz, the Office Action fails to establish sufficient motivation to modify Duluk. Further, the Applicants traverse the assertion by the Examiner that, "such a step

['generating coordinating data for rasterization starting point'] is necessarily required for displaying clipped image in rasterization process" and "therefore, the raster operation of Duluk inherently meets the limitation in recited claim 1." In accordance with M.P.E.P. 2144.03, the undersigned challenges the assertion that Duluk inherently teaches "generating coordinate data representing an initial rasterization starting point estimate" and "providing the initial rasterization starting point estimate to a rasterizer." Accordingly, the undersigned requests that the Examiner cite a reference in support of his position.

Further, Applicants respectfully submit that the Office Action uses improper hindsight reasoning by suggesting it would have been obvious to modify Duluk and Lentz et al., to achieve Applicant's, claim 1 subject matter, where the Office Action, using impermissible hindsight, bases such arguments only upon the teaching or suggestion within Applicants' own disclosure. Applicants submit that there must be some suggestion or motivation, either in the reference itself, or in the knowledge of generally available to one of ordinary skill in the art, to modify the reference as described. Further, to the extent that the Office Action relies on a position that modifications of Duluk and Lentz et al., to meet the claimed invention would have been well within the ordinary skill of the art at the time Applicants' invention was made, because the references, and/or the knowledge of one skilled in the art, were individually known to those of skilled in the art, is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. Applicants submit that if one of ordinary skill in the art at the time of Applicants' invention were to read Duluk and Lentz et al., such a person would not be in possession of Applicants' claimed subject matter.

Dependent Claim 2

The Duluk language cited by the Office Action which states, "for a triangle, set up uses top, bottom, and either left or right corner, depending on the triangle's orientation (Duluk,

col. 33, line 67, through col. 34, lines 1–2 and col. 77, lines 26–37) which is limited to set up using top, bottom, and either left or right corner of a triangle depending on the triangle's orientation rather than, generating "an orientation bit representing an orientation of a line connecting the first and second vertices of the sorted primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates."

Applicants submit that determining an orientation of a one line connecting two vertices of a triangle to another line connecting other vertices of the triangle, are not necessarily required in rendering objects in Duluk. For example, in a left to right sweep of the pixels on the screen, all that is needed is that the system know that a particular pixel lies within the triangle, and need not necessarily know any orientation of one side of the triangle or another, or even that the edge of the object represents a line, rather than a point or a curve.

Further, regarding Schroeder, such reference identifies whether vertices are arranged in a clockwise or counter-clock-wise order, but, Applicants submit does not disclose, teach or suggest Applicants' claimed subject matter including: "... an orientation bit representing an orientation of a line connecting the first and second vertices of the sorted primitive with respect to a line connecting the first and third vertices of the sorted primitive before generating the initial rasterization starting point coordinates," (claim 2). More specifically, the orientation of a line is wholly different than the clockwise/counter-clockwise direction of one vertex when compared to another. Further, because Schroeder is also absent any disclosure, teaching or suggestion of Applicants sorting vertices and the use of an initial rasterization starting point, Schroeder also does not disclose, teach or suggest, whether considered alone or in combination with the other cited references, Applicants' claimed subject matter.

In addition, Applicants also submit that because claim 2 depends from claim 1, and as a dependent claim therefrom, claim 2 is allowable for at least the reasons claim 1 is allowable. Applicants further submit that claim 2 is also allowable in light of the presence of novel and non-obvious elements contained in claim 2 that are not otherwise present in claim 1.

Independent Claim 14

Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 14 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 14 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Dependent Claim 15

Applicants respectfully submit that neither Narayanaswami et al., Lentz et al, and Sfarti teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 14, wherein the initial rasterization starting point circuit further includes a trivial accept circuit operative to provide the actual coordinates of the primitive as the initial rasterization starting point in response to the region bits,"

(Claim 15). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 15 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to

the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles, the use of region bits, and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 15 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 15 depends from claim 14, and as a dependent claim therefrom, claim 15 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 15 is also allowable in light of the presence of novel and non-obvious elements contained in claim 15 that are not otherwise present in claim 14.

Dependent Claim 16

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicants' claimed subject matter including, inter alia:

"The circuit of Claim 15, wherein the vertex data is sorted in y-coordinate fashion and the trivial accept circuit provides the x-coordinate and sorted y-coordinate rasterization starting point of a non-discarded primitive,"

(Claim 15). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 16 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 16 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 16 depends from claim 15, and as a dependent claim therefrom, claim 16 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 16 is also allowable in light of the presence of novel and non-obvious elements contained in claim 16 that are not otherwise present in claim 15.

Dependent Claim 17

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicants' claimed subject matter including, inter alia:

"The circuit of Claim 14, wherein the vertex data includes x-coordinate position data and y-coordinate position data and further including an intercept calculation circuit operative to generate the initial rasterization starting point when the x-coordinate position data or the y-coordinate position data intercepts the boundary defined by the region bits,"

(Claim 17). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 17 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles, the use of region bits, and the generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 17 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 17 depends from claim 14, and as a dependent claim therefrom, claim 17 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 17 is also allowable in light of the presence of novel and non-obvious elements contained in claim 17 that are not otherwise present in claim 14.

Dependent Claim 18

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 17, wherein the boundary interception point generated by the intercept calculation circuit represents the initial rasterization point starting point coordinate,"

(Claim 18). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 18 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 18 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 18 depends from claim 17, and as a dependent claim therefrom, claim 18 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 18 is also allowable in light of the presence of novel and non-obvious elements contained in claim 18 that are not otherwise present in claim 17.

Dependent Claim 19

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 14, further comprising an interception calculation circuit operative to provide a coordinate dependent initial rasterization starting point in response to the region bits and the sorted vertex data,"

(Claim 19). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 19 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of the sorting of vertex data for use with tiles, use of tiles, use of region bits, and generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 19 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

In addition, Applicants also submit that because claim 19 depends from claim 14, and as a dependent claim therefrom, claim 19 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 19 is also allowable in light of the presence of novel and non-obvious elements contained in claim 19 that are not otherwise present in claim 14.

Dependent Claim 20

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 15, wherein the trivial accept circuit further comprises a logic gate coupled to a corresponding subset of the region bits,"

(Claim 20). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 20 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, use of tiles and use of region bits. As such, Applicants

submit that the claimed subject matter of claim 20 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Applicants also submit that because claim 20 depends from claim 15, and as a dependent claim therefrom, claim 20 is allowable for at least the reasons claim 15 is allowable. Applicants further submit that claim 20 is also allowable in light of the presence of novel and non-obvious elements contained in claim 20 that are not otherwise present in claim 15.

Dependent Claim 21

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia: "...The circuit of Claim 20, wherein the logic gate is an AND gate," (Claim 21).

Applicants submit that because claim 21 depends from claim 20, and as a dependent claim therefrom, claim 21 is allowable for at least the reasons claim 20 is allowable. Applicants further submit that claim 21 is also allowable in light of the presence of novel and non-obvious elements contained in claim 21 that are not otherwise present in claim 20.

Dependent Claim 22

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia: "The circuit of Claim 14, wherein the region bits define the top edge, bottom edge, right edge and left edge of a current tile being rendered," (Claim 22). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 22 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of the use of tiles. As such, Applicants submit that the claimed subject matter of claim 22 is

allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination

In addition, Applicants submit that because claim 22 depends from claim 14, and as a dependent claim therefrom, claim 22 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 22 is also allowable in light of the presence of novel and non-obvious elements contained in claim 22 that are not otherwise present in claim 14.

Dependent Claim 24

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 17, wherein the intercept calculation circuit clamps the x-coordinate and y-coordinate of the initial rasterization starting point to the boundary intercept points,"

(Claim 24). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 24 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 24 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Further, Applicants submit that because claim 24 depends from claim 17, and as a dependent claim therefrom, claim 24 is allowable for at least the reasons claim 17 is allowable. Applicants further submit that claim 24 is also allowable in light of the presence of novel and non-obvious elements contained in claim 24 that are not otherwise present in claim 17.

Dependent Claim 25

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"The circuit of Claim 14, further including an orientation circuit, coupled to the region calculation circuit, operative to generate an orientation bit representing an orientation of a line connecting the sorted first and second vertices with respect to a line connecting the sorted first and third vertices,"

(Claim 25). Applicants direct the Examiner's attention to the arguments set forth above regarding claims 1 and claim 2 and submit that for the same, and/or similar reasons, that claim 25 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, generating an orientation bit representing the sorting of vertex data for use with tiles and an orientation of a line connecting the sorted first and second vertices. As such, Applicants submit that the claimed subject matter of claim 25 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Applicants submit that because claim 25 depends from claim 14, and as a dependent claim therefrom, claim 25 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 25 is also allowable in light of the presence of novel and non-obvious elements contained in claim 25 that are not otherwise present in claim 14.

Dependent Claim 26

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia "...The circuit of Claim 14, further including a comparator circuit operative to determine the

relative positioning between the vertices of the primitive and the current tile being rendered,” (Claim 26).

Applicants direct the Examiner’s attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 26 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, the use of tiles. As such, Applicants submit that the claimed subject matter of claim 26 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination

Applicants also submit that because claim 26 depends from claim 14, and as a dependent claim therefrom, claim 26 is allowable for at least the reasons claim 14 is allowable. Applicants further submit that claim 26 is also allowable in light of the presence of novel and non-obvious elements contained in claim 26 that are not otherwise present in claim 14.

Independent Claim 27

Applicants direct the Examiner’s attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 27 is allowable as written. In further support of Applicants’ position, and directing the Examiner’s attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, of (1) the sorting of vertex data for use with tiles, (2) use of tiles, (3) use of region bits, and (4) generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 27 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Independent Claim 28

Applicants respectfully submit that neither Duluk nor Lentz et al., teach or suggest, whether considered alone or in combination, Applicant's claimed subject matter including, inter alia:

"A method, comprising: receiving a pixel tile containing vertex position data for a plurality of primitives; sorting the primitives in axis-dependent order, determining whether the sorted primitives are positioned within a current tile to be transmitted to a rasterizer, determining an initial rasterization point within the sorted primitive,"

(Claim 28). Applicants direct the Examiner's attention to the arguments set forth above regarding claim 1 and submit that for the same, and/or similar reasons, that claim 28 is allowable as written. In further support of Applicants' position, and directing the Examiner's attention to the claim 1 arguments directed to the lack of any disclosure, teaching or suggesting, by any combination of the cited references, generating an orientation bit representing the sorting of vertex data for use with tiles, use of tiles, and generating an initial rasterization starting point estimate. As such, Applicants submit that the claimed subject matter of claim 28 is allowable, as it is not disclosed, taught or suggested by the cited references, whether considered alone, or in combination.

Dependent Claims 29-34

The Duluk language cited in the Office Action at col. 34, lines 11-13, col. 34, lines 34-36 and col. 44, lines 50-64, do not appear to show where Duluk cites "descending" or "ascending" let alone arranging the position data in descending/ascending y- or x-coordinate order, as asserted in the Office Action on page 7.

Applicants submit that at least because claims 29-34 each depend, directly or indirectly, from claim 28, and as a dependent claim therefrom, claims 29-34 are allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 29-34 are also allowable in

light of the presence of novel and non-obvious elements contained in claims 29–34 that are not otherwise present in claim 28.

Dependent Claims 35–40

According to Duluk, as cited at col. 34, lines 11–56, “these descriptors are used for clipping of primitives on top and bottom of tile edge.” (Duluk, col. 34, lines 29–31). Therefore, as such, Duluk does not, disclose, teach or suggest Applicants’ claimed subject matter including “discarding the primitive when *the* x-coordinate position is greater than *the* largest corresponding coordinate position of the current tile,” (claim 35), “discarding the primitive when *the* x-coordinate position is less than *the* smallest corresponding coordinate position of the current tile,” (claim 36), “discarding the primitive when *the* y-coordinate position is greater than *the* largest corresponding coordinate position of the current tile,” (claim 37), and “discarding the primitive when *the* y-coordinate position is less than *the* smallest corresponding coordinate position of the current tile,” (claim 38). In contrast with that disclosed, taught or suggested by Duluk, either when considered alone or when considered in combination with Lentz et al., Applicants’ novel sorting approach, along with its other novel operational techniques, allows for the discarding of an entire primitive based on a comparison between one x-coordinate position of the primitive with one coordinate position of the current tile.

To the extent that the Office Action made official notice that the clipping process including a comparison between the coordinate values of the primitive with the coordinate values of a current tile is well known in the art, Applicants respectfully request that the Examiner provide a reference as a representative example pursuant to M.P.E.P. 2144.03.

Therefore, since none of the cited references teach or suggest discarding the primitive when the x-coordinate position is greater than the largest corresponding coordinate position of the current tile, discarding the primitive when the x-coordinate position is less than the smallest

corresponding coordinate position of the current tile, discarding the primitive when the y-coordinate position is greater than the largest corresponding coordinate position of the current tile, or discarding the primitive when the y-coordinate position is less than the smallest corresponding coordinate position of the current tile, the combination of any of the cited references cannot produce the Applicants' invention as claimed.

Applicants also submit that because claims 35-40 depend from claim 28, and as dependent claims therefrom, claims 35-40 is allowable for at least the reasons claim 28 is allowable. Applicants further submit that claims 35-40 are also allowable in light of the presence of novel and non-obvious elements contained in claims 35-40 that are not otherwise present in claim 28.

CONCLUSION

For the foregoing reasons, withdrawal of the rejections and allowance of the claims is respectfully requested. If there are any questions or comments regarding this response, the Examiner is encouraged to contact the undersigned at 312-609-7500.

Respectfully submitted,

By: 

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Dated: July 7, 2004

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